



28. (A) What are the methods for nanomaterial synthesis ?

OR

(B) Give an example to explain the role of nanotechnology in diagnostic application.

29. (A) Compare DTA and TGA.

OR

(B) Discuss the principle, application and working of DSC.

30. (A) How many lines are observed in the ESR spectrum of $Ti(H_2O)_6^{3+}$ (I for $Ti^{3+} = 2S$) ? Explain.

OR

(B) How many lines are observed in the ESR spectrum of $VO(acac)_3$? Explain.

(4x8=32)



Reg. No. :

Name :

IV Semester M.Sc. Degree (CBSS-Reg./Suppl./Imp.) Examination, April 2020
(2014 Admission Onwards)

CHEMISTRY

CHE4C.12 : Interdisciplinary Topics and Instrumentation Techniques

Time : 3 Hours

Max. Marks : 60

SECTION – A

Answer **all** questions in **one** word or **one** sentence. **Each** question carries **one** mark.

1. Self assembly in a DNA strand is due to _____.
2. Kramers degeneracy gives _____ (number) signals for Cr^{3+} .
3. How is Cannizaro reaction done in a green manner ?
4. 18-Crown-6 is best to capture _____ ion.
5. _____ technique can be used to study the glass transition temperature of polymers.
6. For a two electron system the zero field splitting results in _____ (number) signal.
7. What is biomimetics ?
8. What technique is used to measure nanoparticle dimension ? **(8x1=8)**

SECTION – B

Answer **any eight** questions. Answer may be in **two** or **three** sentences.

Each question carries **two** marks.

9. What are quantum dots ?
10. Give the principle of turbidometry.



- 11. Explain structure and application of cyclodextrin.
- 12. How many hyperfine splitting lines are observed in butadiene radical anion ?
- 13. Explain Doppler effect.
- 14. How is Mossbauer spectroscopy useful to determine the valence state of iron ?
- 15. Why are ionic liquids used in organic synthesis ? Give example.
- 16. How is supercritical carbon dioxide useful ?
- 17. What is a dynamic mechanical analyzer ?
- 18. Give a major application of nanotechnology in medicine.
- 19. What is nanolithography ?
- 20. Differentiate between Fermi contact interaction and dipole interaction. **(8×2=16)**

SECTION – C

Short paragraph questions. Answer **any four** questions. **Each** question carries **three** marks.

- 21. What are cyclophanes and cryptands ? Give example.
- 22. Explain the principle and application of light scattering technique.
- 23. Give two examples of synthesis using microwave radiation.
- 24. How does the TGA curve of CaCO₃ look like ? Explain.
- 25. What are polymeric nanocomposites ? How are they advantageous ?
- 26. "TEM image of iron oxide nanoparticle show regularly arranged dots." Explain the statement. **(4×3=12)**

SECTION – D

Essay type questions. Answer **four** questions. **Each** question carries **six** marks.

- 27. A) Comment on the synthesis and application of porphyrins and calixarenes.
OR
B) What are the various alternatives to use of organic solvents ?



- 28. A) What are the methods for nanomaterial synthesis ?
OR
B) Give an example to explain the role of nanotechnology in diagnostic application.
- 29. A) Compare DTA and TGA.
OR
B) Discuss the principle, application and working of DSC.
- 30. A) How many lines are observed in the ESR spectrum of Ti[(H₂O)₆]³⁺ (I for Ti³⁺ = 3/2) ? Explain.
OR
B) How many lines are observed in the ESR spectrum of VO(acac) ? Explain. **(4×6=24)**